O I P E JC48
APR 1 1 2003
PATENT & TRADEMARK OFFICE

ATTACHMENT A

THE INTERNATIONAL DICTIONARY OF PHYSICS AND ELECTRONICS

D. VAN NOSTRAND COMPANY, INC.

PRINCETON, NEW JERSEY

TORONTO LONDON

NEW YORK

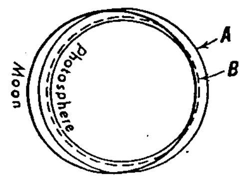
cathode thought to be due to irregularities in the cathode surface.

FLASHBACK VOLTAGE. The peak inverse voltage at which ionization occurs in a gas-tube.

FLASH POINT. The lowest temperature at which a substance will decompose to an inflammable gaseous mixture, demonstrable through its explosive quality.

FLASHOMETER. A device for studying the time-intensity distribution of flashes of light.

FLASH SPECTRUM. At the instant of second or third contact during a total solar **eclipse** the edge of the moon is tangent to the **photosphere** of the sun as shown in the figure.



With the photosphere (B) covered, the highly heated atmosphere of the sun, known as the **reversing layer** and the **chromosphere** (A), flashes into view. With the photosphere covered the continuous spectrum of the sun is cut off and the bright-line **spectrum** radiated by the atmosphere may be observed.

FLAT SPACE-TIME. Space-time for which the **Riemann-Christoffel tensor** vanishes. The **metric** can then always be chosen thus

$$g_{\mu\nu} = \delta_{\mu\nu}, \text{ if } x_4 = ict.$$

F LBF S SYSTEM OF UNITS. Any system of units based on the choice of the foot, the pound force and the second as fundamental quantities. (See **Introduction.**)

FLEMING VALVE. An early **thermionic diode** used as a **detector.**

FLETCHER-MUNSON CONTOURS. Equal **loudness** curves for pure tones (see **tone, simple**), plotted as contours on a sound pressure–sound frequency graph.

FLEXION-POINT EMISSION CURRENT. That value of current on the **diode characteristic** for which the second derivative of the current with respect to the voltage has its maximum negative value. This current corresponds to the upper flexion point of the diode characteristic, and is an approximate measure of the temperature-limited emission current.

FLEXURAL WAVE. See **wave, flexural.**

FLEXURE. A term which is used to denote the curved or bent state of a loaded beam. A horizontally located **beam**, transversely loaded with vertically directed load, offers an example of load-carrying ability derived through flexure. In flexure, an elastic structural material undergoes a deflection sufficient to set up in its material stresses which will support the load. Deflection under load is an essential and necessary part of the process of load carrying by a beam, for until the deflection has occurred, there are set up in the beam no resisting forces. Thus if an unloaded beam is perfectly straight and horizontal, it must assume a slightly curved position if any external load is supported by it. The only way in which a loaded beam could be straight would be to have had an initial deflection in a direction opposite to the loading.

FLICKER. The sensation produced by a fluctuation in brightness at a rate comparable to the reciprocal of the period of persistence of vision.

FLICKER EFFECT. Minute variations in the cathode current of **thermionic** vacuum **tubes** which may be caused by random changes in cathode activity or positive ion emission.

FLICKER PHOTOMETER HEAD. A **bench photometer** head in which, by means of a rotating sector-disk, the two illuminations to be compared are presented to the observer in rapid alternation (but not too rapid), any difference between them being detected as a noticeable **flicker.** This type of photometer is especially useful when the sources are not of exactly the same color.

FLIP-FLOP CIRCUIT. (1) An **Eccles-Jordan circuit** or **bistable multivibrator.** (2) The use of this term in color television, for **color-phase alternation,** should be avoided.

FLOATING BODY, STABLE EQUILIBRIUM OF. See **stable equilibrium of floating body.**

FLOATING BODY, UNSTABLE EQUILIBRIUM OF. See **unstable equilibrium of fl ating body.**

forces are removed. Each of its several types is probably due to the action of intermolecular forces which are in equilibrium only for certain configurations.

Deformation or, more briefly, strain is of various kinds; in each case its measure is a certain abstract ratio. For example, the elongation of a rod under tension is expressed as the ratio of the increase in length to the unstretched length. Linear compression is the reverse of elongation. They are both accompanied by a fractional change in diameter, the ratio of which to the elongation is called the Poisson ratio. Shear is a strain involving change of shape, such that an imaginary cube traced in the unstrained material becomes a rhombic prism. The measure of shear is the tangent of the angle through which the oblique edges have been made to depart from their original perpendicular direction. Volume strain is the ratio of a decrease in volume to the normal volume. **Flexure** or bending, and torsion or twisting, are combinations of these more elementary strains. A straight rod bent into a plane curve undergoes elongation on the convex side and linear compression on the concave side, while there is an intermediate neutral layer which suffers neither.

For every strain there arises, in an elastic substance, a corresponding stress, which represents the tendency of the substance to recover its normal condition. Stress is expressed in units of force per unit area. Tensile stress, for example, is the ratio of the force of tension to the normal cross-section of the rod subjected to it. Shearing stress is the force tending to push one layer of the material past the adjacent layer, per unit area of the layers. Pressure, expressed in like units, is the stress corresponding to volume compression, etc.

For each type of strain and stress there is a modulus, which is the ratio of the stress to the corresponding strain. In the case of elongation or linear compression, it is commonly called the **Young modulus**; we also have the **bulk modulus** and the **shear modulus** or rigidity.

In engineering design the **Young modulus** is used for tension and compression and the rigidity modulus for shear, as in torsion springs. (See **Hooke law.**)

ELECTRALLOY. An alloy of iron frequently used for chassis or panels in electronic equipment.

ELECTRET. A permanently-polarized piece of **dielectric** material; the analog of a magnet. Barium titanate ceramics, preferably containing a small percentage of lead titanate, can be polarized by cooling from a temperature above the **Curie point** in an applied electric field. Electrets are also produced by solidification of mixtures of certain organic waxes in a strong electric field.

ELECTRIC AND MAGNETIC DOUBLE REFRACTION. In 1875 Kerr discovered that glass and many other isotropic, transparent solids and liquids exhibit **double refraction** like crystals, when placed in a strong electric field; and in 1905 Cotton and Mouton, after some preliminary results by Kerr and others, demonstrated the corresponding phenomenon with a magnetic field. These are now known respectively as the Kerr electro-optical effect and the Cotton-Mouton effect. In both cases the magnitude of the effect, as measured by the phase difference produced per unit thickness of medium, is, for a given substance, wavelength, and temperature, proportional to the square of the field intensity. The optic axis of the doubly refracting substance corresponds to the direction of the imposed field.

Of the two phenomena the Kerr effect is much more pronounced and is as yet the only one of practical importance. The Kerr cell, in which nitrobenzene, a liquid, is commonly employed because of its large and quick response to the electric field, has in recent years been extensively used as an electro-optical control or shuttter for light beams, for example, in the recording of sound pictures. Recently, ferrites have been used to rotate the **plane of polarization** of microwaves, in the presence of a magnetic field.

ELECTRIC(AL) AXIS. The axis of a crystal which offers minimum resistance to the passage of current.

ELECTRIC(AL) BRIDGE. See **bridge, electrical.**

ELECTRIC(AL) CONDUCTIVITY, THEORY OF. See **conductivity, electrical.**

ELECTRIC CONSTANT. (Symbol ϵ_0 or γ_e.) The electric constant pertinent to any system of units is the scalar dimensional factor ϵ_0 appearing in the **Coulomb law of force** between two charges in vacuo:

$$F = q_1 q_2 / n\epsilon_0 r^2$$

consistent with the laws of Newton and f Coulomb, although Einstein believed that such general arguments were not applicable.

EINSTEIN UNIT. A photochemical unit quantity defined under the heading **Stark-Einstein** equation.

EINSTEIN UNIVERSE. Model of the universe in which the interval between two events is given by

$$ds^2 = c^2dt^2 - r^2(d\theta^2 + \sin^2 \theta d\phi^2) - \frac{dr^2}{1 - r^2/R^2}$$

where R is the radius of the universe. The model may be regarded as a four-dimensional cylindrical surface embedded in five-dimensional space.

EINSTEIN VISCOSITY EQUATION (FOR SOLS). For a suspension of rigid spheres

$$\eta_{sp} = \frac{\eta}{\eta_0} - 1 = 2.5\phi$$

where η_{sp} is the **specific viscosity,** η_0 is the **viscosity** of pure solvent, and ϕ is the volume fraction of the disperse phase, and is equal to the volume of the spheres (or particles), divided by the total volume.

In the derivation the following assumptions are made:

1. The radii of the spheres are large compared with those of the solvent, but small compared with the dimensions of the apparatus.
2. The distance between the spheres is large compared with their radius, i.e., the volume concentration of the particles is small.
3. The effects of gravitation and inertia are negligible.

EINSTEINIUM. See **Element #99.**

ELASTANCE. The reciprocal of **capacitance,** measured in **darafs.**

ELASTIC AFTER-EFFECT OR LAG. The time delay which some substances exhibit in returning to original shape after being stressed within their **elastic limits.** There is some evidence that the magnitude of this time depends on the homogeneity of structure of the substance. For instance, quartz, which has a homogeneous structure, shows almost no lag. Glass, which is a mixture of aggregates, can hav a time delay of the order of hours.

ELASTIC AXIS. See **flexur** .

ELASTIC COEFFICIENTS, LATTICE THEORY OF. The **elastic constants** and **elastic moduli** of crystals may be calculated on the assumption that the only forces are those between near neighbors in the lattice. Such a calculation gives reasonable results for **ionic crystals,** but is quite unsatisfactory for metals, where the **Cauchy relations** are not obeyed. The **free electron gas** in a metal is not easily compressed but scarcely opposes **shear.**

ELASTIC COLLISION. See **collision, elastic.**

ELASTIC CONSTANTS (ALSO KNOWN AS COMPLIANCE CONSTANTS). The coefficients of the relations by which the components of the elastic **strain** are expressed as linear functions of the **stress** components. In general there are 21 different coefficients, but the number may be reduced by the **crystal** symmetry of the solid. (See also **Voigt notation.**)

ELASTIC CURVE. The curve of the **neutral** surface of a structural member subjected to **loads** which cause bending is called the elastic curve. The ordinates between this curve and the original position of the neutral surface represent the **deflections** due to bending.

ELASTIC HYSTERESIS CONSTANT. The ratio of the area (expressed in energy units) of the **stress-strain loop,** for a unit volume of the material, to the square of the maximal strain.

ELASTIC LIMIT. The maximum unit **stress** which can be obtained in a structural material without causing a permanent **deformation** is called the elastic limit.

ELASTIC MODULI (OR STIFFNESS CONSTANTS). The coefficients of the relations by which the components of **stress** are expressed as linear functions of the components of the elastic **strain.** The number of these depends on the crystal symmetry of the material. (See also **Voigt notation.**)

ELASTIC SCATTERING. See **scattering, elastic.**

ELASTICITY. The property whereby a body, when deformed, automatically recovers its normal configuration as the deforming

D. VAN NOSTRAND COMPANY, INC.

120 Alexander St., Princeton, New Jersey
257 Fourth Avenue, New York 10, New York
25 Hollinger Rd., Toronto 16, Canada
Macmillan & Co., Ltd., St. Martin's St., London, W.C. 2, England

All correspondence should be addressed to the principal office of the company at Princeton, N. J.

Published simultaneously in Canada by
D. VAN NOSTRAND COMPANY (Canada), LTD.

Library of Congress Catalogue Card No.: 56-11759

First Printing, August 1956
Second (Prepublication) Printing, August 1956

PRINTED IN THE UNITED STATES OF AMERICA

D. VAN NOSTRAND COMPANY, INC.
120 Alexander St., Princeton, New Jersey
257 Fourth Avenue, New York 10, New York
25 Hollinger Rd., Toronto 16, Canada
Macmillan & Co., Ltd., St. Martin's St., London, W.C. 2, England

All correspondence should be addressed to the principal office of the company at Princeton, N. J.

Published simultaneously in Canada by
D. VAN NOSTRAND COMPANY (Canada), LTD.

Library of Congress Catalogue Card No.: 56-11759

First Printing, August 1956
Second (Prepublication) Printing, August 1956

PRINTED IN THE UNITED STATES OF AMERICA

Webster's Third New International Dictionary

OF THE ENGLISH LANGUAGE UNABRIDGED

A Merriam-Webster
REG. U.S. PAT. OFF.

Utilizing all the experience and resources of more than one hundred years of Merriam-Webster® dictionaries

EDITOR IN CHIEF
PHILIP BABCOCK GOVE, Ph.D.
AND
THE MERRIAM-WEBSTER
EDITORIAL STAFF

MERRIAM-WEBSTER INC., *Publishers*
SPRINGFIELD, MASSACHUSETTS, U.S.A.